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## ON TWO NEW SPECIES OF STARFISHES.

BY J. E. IVES.

While engaged in reviewing the starfishes in the collection of the Academy, I found two forms belonging to the genera *Pteraster* and *Coronaster* which do not appear to have been described. They may be thus characterized:

***Pteraster tessellatus*, n. sp.**

Dorsal surface very convex; arms tapering at their aboral ends, and much recurved. Supradorsal membrane regularly reticulated; reticulation forming obliquely arranged hexagonal areas, which are very apparent upon the sides of the arms. No spicules found in the supra-dorsal membrane. Paxillæ about 2 mm. high. Each paxilla surmounted by eight radiating spinelets enclosing a number of smaller ones.



The spinelets when examined under the microscope are found to be composed of two or more connected many-sided hollow cylinders, the sides of which are perforated by elongated apertures as shown in the figure representing a portion of a cylinder highly magnified. The distal ends of the spinelets are inserted into the delicate membranous bands which form the reticulation of the supra-dorsal membrane. Some of the spinelets perforate this membrane in the centres of the hexagonal areas, projecting slightly on the surface. On the dorsal surface of the disk and arms, especially in the hollows of the inter-radial portions of the disk and of the recurved arm, there are numerous minute folds of the integument that produce a somewhat granulate appearance of the membrane. There are 25-30 spiracula in each hexagonal area. The oscular orifice is surrounded by a number of webbed spinelets.

On the ventral surface the actino-lateral spines are short, about 70 on each side of the ambulacral furrow. There are a corresponding number of ambulacral combs. At the base of the arm each comb has 6 spines; the three outer spines are the longest and about equal; the fourth (counting from the outside) rather smaller, the fifth very small, and the rudimentary sixth spine very minute, and directed towards the aboral end of the arm. The number of spines

in a comb decreases towards the end of the arm. The ambulacral feet are in two rows, 80–90 feet in each ray. There are twelve spines at each angle of the mouth forming a single web. The four central spines are the longest, the first pair of spines on the outside of these rather smaller, the next half the size of the last pair, and the two outermost pairs very short. Two large well developed secondary mouth-spines in each interradian angle.

Greatest diameter of specimen from tip of one arm to tip of an opposite arm 100 mm.; proportion of radius of disk to radius of arm as 1 to 2: height of disk 35 mm.

A single specimen; color in alcohol, dull yellowish grey.

This species differs from *Pteraster pulvillus*, Sars, to which it appears to be closely allied, by its longer arms; the absence of large conical papillæ upon the supra-dorsal membrane; its greater size, being about half as large again; the relatively much greater number of ambulacral combs and actino-lateral spines, and the different size and number of the spines of the ambulacral combs. It also appears to be closely allied to *Pt. semireticulatus*, Sladen, but may be distinguished from it by the prominent central spinelets of the paxillæ, which perforate the supra-dorsal membrane; the greater number and difference in size of the spiracula; the absence of any tendency towards a quadruple arrangement of the ambulacral feet—the greater number of ambulacral and mouth spines, and in its greater size being about  $3\frac{1}{2}$  times as large as *Pt. semireticulatus*. It differs altogether from *Pteraster aporus*, described by Dr. H. Ludwig from Behring Sea,—*Pt. aporus* having no oscular orifice. *Pt. aporus* appears to be the only species of *Pteraster* that has hitherto been described from that region.

Below, I give a list of the species of *Pteraster* that have been described up to the present time.

- P. militaris*, O. F. Müller. Zool. Dan. Prodr. p. 234; Müller and Troschel, System der Asteriden, pp. 44, 128, pl. VI, fig. 1; Sars, Oversigt af Norges Echinodermer, p. 48, Tab. iv, v, vi, fig. 1–13.
- P. militaris*, O. F. Müller, var. *prolata*, Sladen. Trans. Roy. Soc. Edinb. xxxii, p. 153.
- P. puvillus*, Sars. Oversigt af Norges Echinodermer, p. 62, Tab. vi, figs. 14–18, Tab. vii, viii, ix, figs. 1–6.
- P. multipes*, Sars. Vidensk. Selskabs. Forhandlinger, 1865, p. 200; Fauna littoralis Norvegiæ p. 65. Tab. viii, figs. 1–17.

- P. Danaë*, Verrill. Proc. Bost. Soc. Nat. Hist. vol. xii, p. 386;  
 Trans. Conn. Acad. vol. i, p. 568, pl. IX, figs. 11, 11a.  
*P. affinis*, E. A. Smith. Ann. Nat. Hist. (4), vol. xvii, p. 108.  
*P. rugatus*, Sladen. Journ. Linn. Soc. vol. xvi, p. 195.  
*P. stellifer*, Sladen. Journ. Linn. Soc. vol. xvi, p. 195.  
*P. semireticulatus*, Sladen. Journ. Linn. Soc. vol. xvi, p. 195.  
*P. caribbæus*, Perrier. Comptes Rendus xcii, p. 59; Bull. Mus.  
 Comp. Zool. ix, p. 13; Nouv. Arch. Mus. (2) vi, p. 216.  
*P. aporus*, Ludwig. Zoologische Jahrbücher 1886, p. 293.

**Coronaster bispinosus**, n. sp.

Twelve long slender arms.

Dorsal skeleton of disk reticulated; formed of imbricated ossicles, and enclosing irregularly shaped meshes in which are found from four to ten respiratory tubes. Distributed irregularly on the skeleton of the disk are short spines, each bearing a little cluster of crossed pedicellariæ. Madreporic plate small and submarginal.

Dorsal skeleton of arms reticulated: Reticulation formed by five longitudinal bands of imbricated ossicles, connected at about every fourth plate by similar transverse bands, forming large rectangular meshes. Meshes longest in the direction of the arms, containing a large number of tentacular papillæ. Sometimes closer and irregular in shape at the base of the arms. At the junction of the longitudinal and transverse bands, stand long pointed spines, each spine surrounded about its middle by a closely packed cluster of crossed pedicellariæ.

Each of the adambulacral plates carries an inner and outer spine, the outer spine being slightly more adoral than the inner one, thus showing a tendency of the two spines to alternate.

Length from centre of disk to end of arm, 140m; radius of disk, 12m.

Color of the single specimen in alcohol pale flesh color, with the skeletal portions white.

This form undoubtedly belongs to the genus *Coronaster* of Perrier (*Echinodermes du Travailleur et du Talisman*, *Annales des Sciences Naturelles*, VI<sup>e</sup> Serie, T. XIX. No. 8, 1885.) He gives, however, as a character of the genus the existence of a single spine on each adambulacral plate, whereas in *Coronaster bispinosus* there are two such spines to each plate. This character of the genus must therefore be modified in order to admit this species.

The form described differs from *Coronaster Parfaiti*, Perrier, the only other species of the genus, principally by the character above mentioned, viz, the existence of two spines on each adambulacral plate. It also differs by its greater size, the radius of the disk being twice as great, and the arms from the centre of the disk to their tips, three times as long.